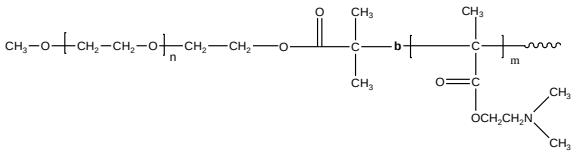
Sample Name:

Poly(ethylene oxide -b- 2-(dimethylamino)ethyl methacrylate)

Sample #: **P8587- EODMAEMA**

Structure:



Composition:

Mn x 10^3 PEO-b-PDMAEMA	PDI
5.0-b-5.5	1.3

Synthesis Procedure:

Poly(ethylene oxide –b- 2-(dimethylamino)ethyl methacrylate) is prepared by living anionic polymerization of ethylene oxide and than control radical process for 2-(dimethylamino)ethyl methacrylate polymerization .

Characterization:

An aliquot of the first anionic block was analyzed by size exclusion chromatography (SEC) to obtain the molecular weight and polydispersity index (PDI) before addition of the second block. The final block copolymer composition and molecular weight are calculated from ^{1}H-NMR spectroscopy by comparing the peak area of the ethylene oxide protons at about about 3.6 ppm with the methylene in 2-(dimethylamino)ethyl methacrylate protons at about 4.28 ppm. No SEC signal of the diblock polymer is show because there is strong interaction between the polymer and the column although different eluent and buffers have been tried.

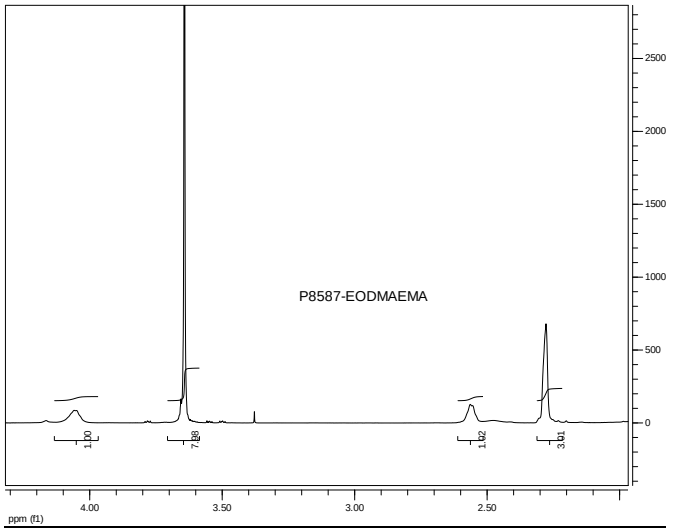
Purification of the polymer and removal of any un-reacted homopolyethylene oxide from the diblock copolymer:

Polymer dissolved in water and the pH of the medium increased to about 13 by adding NaOH. Now the solution warmed to 80 oC and the polymer precipitated out. This procedure was repeated 2 time to removed any homo PEO. Now the polymer dissolved in methanol and pH was adjusted to about 8 by adding HCL The polymer solution was filtered and the solvent was removed by rota-evaporator. The highly viscous solution was precipitated in cold hexane/ether mixture. The polymer was dried under vacuum at 40^{o}C.

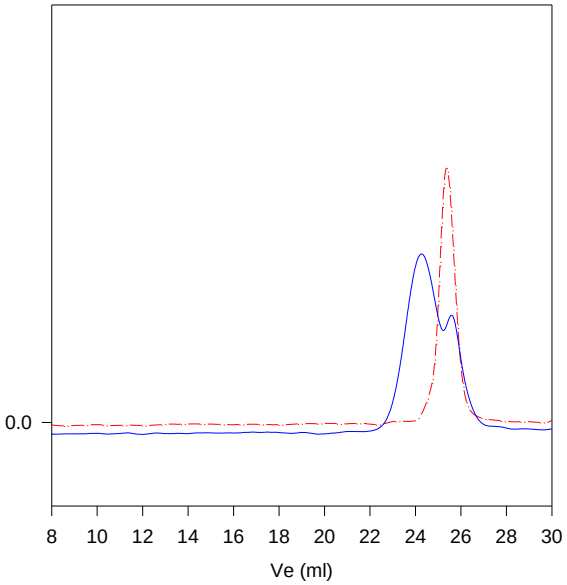
Solubility:

The polymer is soluble in water.

^{1}H-NMR Spectrum of the block copolymer:



P8587-EODMAEMA



Size exclusion chromatography of the product

PEO, M_n=5000, M_w=5200, Mw/Mn=1.05

Poly(ethylene oxide-b-N,N-dimethylaminoethylmethacrylate)

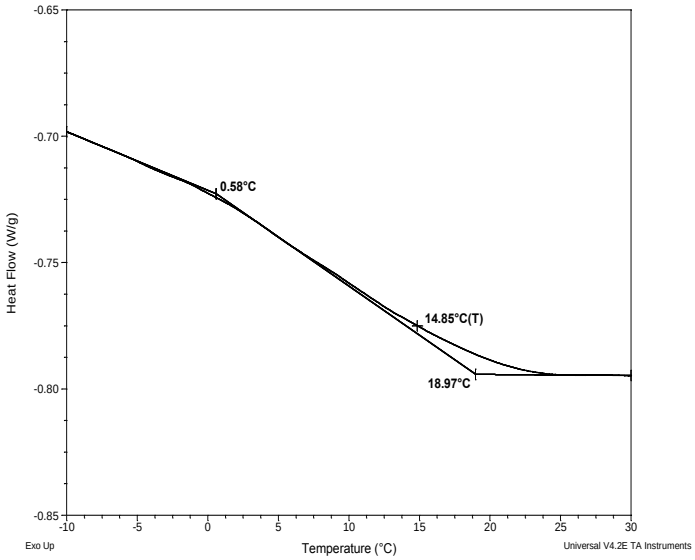
Mn: PEO(5000)-b-DMAEMA(5500) Mw/Mn=1.3
From SEC profile indicates about 12% homo-PEO present in the diblock copolymer

Thermal analysis of # P8587-EODMAEMA

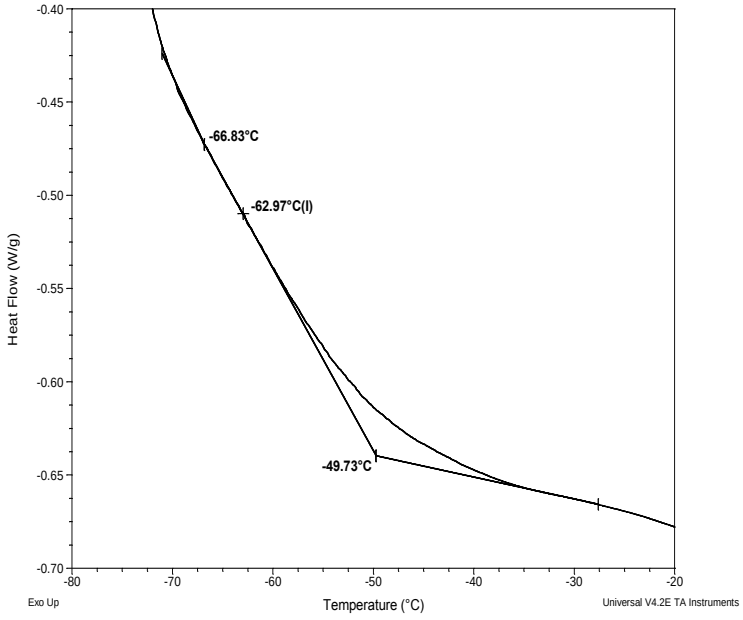
Thermal analysis of the samples was carried out on a TA Q100 differential scanning calorimeter at a heating rate of 15°C/min.The midpoint of the slope change of the heat flow plot of the second **heating scan** was considered as the glass transition temperature (T_g).

Thermograms for the sample

For DMAEMA block



For PEO block



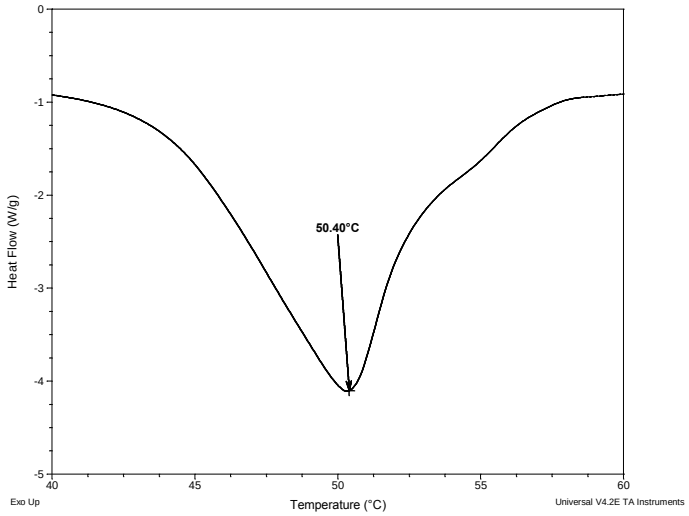
Thermal analysis results at a glance

For DMAEMA block		
T_g: 15°C	T_m: -	T_c: -
For PEO block		
T_g: -63°C	T_m: 50°C	T_c: 16°C

Melting and crystallization curve for the sample

The melting temperature (T_m) was taken as the maximum of the endothermic peak where as the crystallization temperature (T_c) was considered as the minimum of the exothermic peak. The T_c was calculated during **cooling ramp**.

Melting curve for PEO block



Crystallization curve for PEO block